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Proceedings of a Regional Advisory Process Meeting on the Level of Allowable Mortality of Atlantic Whitefish in Support of Species at Risk

23 November 2004
Coastal Inn
Dartmouth, NS

Robert O'Boyle
Meeting Chairperson

Maritime Provinces
Regional Advisory Process
Bedford Institute of Oceanography
1 Challenger Drive, P.O. Box 1006
Dartmouth, Nova Scotia
B2Y 4A2

Compte rendu d'une réunion du Processus consultatif régional au sujet de la mortalité acceptable a la corégone atlantique en tant qu'espèce en péril

Le 23 novembre 2004
Coastal Inn
Dartmouth (N.-É.)

Robert O'Boyle
Président de la réunion

Processus consultatif régional des provinces Maritimes
Institut océanographique de Bedford
1, promenade Challenger, C.P. 1006
Dartmouth (Nouvelle-Écosse)
B2Y 4A2

April 2005 / avril 2005

Canada

Foreword

The purpose of these proceedings is to archive the activities and discussions of the meeting, including research recommendations, uncertainties, and to provide a place to formally archive official minority opinions. As such, interpretations and opinions presented in this report may be factually incorrect or mis-leading, but are included to record as faithfully as possible what transpired at the meeting. No statements are to be taken as reflecting the consensus of the meeting unless they are clearly identified as such. Moreover, additional information and further review may result in a change of decision where tentative agreement had been reached.

Avant-propos

Le présent compte rendu fait état des activités et des discussions qui ont eu lieu à la réunion, notamment en ce qui concerne les recommandations de recherche et les incertitudes; il sert aussi à consigner en bonne et due forme les opinions minoritaires officielles. Les interprétations et opinions qui y sont présentées peuvent être incorrectes sur le plan des faits ou trompeuses, mais elles sont intégrées au document pour que celui-ci reflète le plus fidèlement possible ce qui s'est dit à la réunion. Aucune déclaration ne doit être considérée comme une expression du consensus des participants, sauf s'il est clairement indiqué qu'elle l'est effectivement. En outre, des renseignements supplémentaires et un plus ample examen peuvent avoir pour effet de modifier une décision qui avait fait l'objet d'un accord préliminaire.

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200, rue Kent Street
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K1A 0E6

http://www.dfo-mpo.gc.ca/csas/

CSAS@DFO-MPO.GC.CA

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ABSTRACT

Atlantic whitefish (*Coregonus huntsmani*) is designated as "endangered" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and is listed on Schedule 1 of the Species at Risk Act (SARA). Believed to have been widespread at one time, and restricted to two disjunct drainages by the time of their discovery in 1922, Atlantic whitefish are now limited in distribution to the Petite Rivière watershed. Life-cycle closure is a certainty only for resident fish within three semi-natural lakes which cannot be accessed from the sea.

The prohibitions associated with SARA came into force on June 1, 2004 and subsequently SARA provided legal protection to this species. SARA provides that the Minister of Fisheries and Oceans may issue a permit to allow for incidental harm to a listed species if a number of conditions are met. The analysis discussed at this meeting will allow the Minister of Fisheries and Oceans to determine the basis under which permits are to be issued in Atlantic Canadian waters.

There are no indications to suggest that current human activities within the Petite Rivière drainage pose a threat to the survival of Atlantic whitefish. However, there is no scope for further harm. New activities or planned changes to existing activities will be evaluated on a case by case basis to determine the likelihood of additional harm. Additionally, there is no certainty that harm arising from current activities will remain low once smallmouth bass have become established in the Petite Rivière drainage.

RÉSUMÉ

Le corégone atlantique (*Coregonus huntsmani*) est considéré comme « espèce en voie de disparition » par le Comité sur la situation des espèces en péril au Canada (COSEPAC) et il est inscrit sur la liste de l'annexe 1 de la *Loi sur les espèces en péril* (LEP). On croit qu'il a été répandu à une certaine époque, mais lors de sa découverte, en 1922, il n'était plus présent que dans deux bassins versants distincts. Actuellement, sa distribution se limite au bassin versant de la Petite Rivière. C'est uniquement dans le cas de la population de corégone atlantique résidant dans trois lacs semi-naturels inaccessibles depuis la mer qu'on a la certitude que son cycle biologique est bouclé.

Les interdictions connexes à la LEP sont entrées en vigueur le 1er juin 2004 et l'espèce bénéficie depuis lors de la protection de cette loi. Celle-ci confère au ministre des Pêches et des Océans le pouvoir d'octroyer un permis autorisant des dommages fortuits à une espèce inscrite sur la loi officielle, à certaines conditions. L'analyse dont il est question ici aidera le ministre des Pêches et des Océans à déterminer dans quelles circonstances des permis doivent être octroyés pour les eaux canadiennes de l'Atlantique.

Rien n'indique que les activités anthropiques qui ont cours actuellement dans le bassin versant de la Petite Rivière menacent la survie du corégone atlantique. On examinera les nouvelles activités ou propositions de changement à celles qui existent déjà au cas par cas, afin de déterminer si elles risquent d'occasionner des dommages supplémentaires. Par ailleurs, il n'est pas certain que les dommages découlant des activités actuelles resteront faibles une fois que l'achigan à petite bouche sera bien implanté dans le bassin versant de la Petite Rivière.

INTRODUCTION

The chair, R. O'Boyle, opened the meeting by greeting the participants (Appendix I). The letter of invitation, terms of reference and agenda are presented in appendices II, III and IV respectively.

The objective of the meeting was to evaluate the level of harm that would not jeopardize the survival or recovery of Atlantic whitefish and to identify the potential sources of human-induced harm. Guidelines produced at a DFO National Science meeting during 8–10 March 2004 (Rice, 2004) were used in this evaluation. In support of this objective, two working papers addressing these issues were considered: Bradford et al. 2004. Status, Trend, and Recovery Considerations in Support of an Allowable Harm Assessment for Atlantic Whitefish (*Coregonus huntsmani*). DFO Can. Sci. Advis. Sec. RAP Working Paper 2004/37 and Bradford et al. 2004. Scope for Human-Induced Mortality in the Context of Atlantic Whitefish (*Coregonus huntsmani*) Survival and Recovery. DFO Can. Sci. Advis. Sec. RAP Working Paper 2004/38.

The products of the meeting are these proceedings, which provide details of the discussion generated in review of the working papers, and a Status Report providing the conclusions of the review.

The Chair described the structure of the meeting. The rapporteur was identified as K. Robichaud-LeBlanc. The principle author of the working papers (R. Bradford) presented the results of the analyses, during which questions of clarification were addressed. Participants were then given the opportunity to comment on the content of the documents.

The discussion outlined in these Proceedings did not necessarily occur in the order provided. As the discussion often jumped from one topic to another, the comments have been sorted by topic to facilitate readership.

REVIEW OF SPECIES STATUS AND SCOPE FOR HUMAN-INDUCED MORTALITY

Presentation Highlights

R.G. Bradford, D. Longard, and P. Longue. 2004. Status, Trend, and Recovery Considerations in Support of an Allowable Harm Assessment for Atlantic Whitefish (*Coregonus huntsmani*). DFO Can. Sci. Advis. Sec. Res. Doc. 2004/109

There is information available to update the status of Atlantic whitefish beyond the 2000 COSEWIC assessment (endangered) (Edge and Gilhen 2001). An update and

review of the data used to support previous assessments is required to determine to the extent possible 1) the historical and current distribution of both anadromous and land-locked Atlantic whitefish, and 2) the timing of change in distribution/abundance of both life-history variants in order to provide context to effects of past human activities. The presentation summarized available data for the Tusket-Annis and Petite rivers and estuaries pertaining to species distribution and trends from science collections and local knowledge (including traditional ecological knowledge) and indicated the nature of uncertainties associated with each source. Additional information of relevance to possible occurrences of Atlantic whitefish beyond the bounds of these two river drainages was also reported, namely the LaHave River and lake/river systems in Nova Scotia for which possible occurrences of Atlantic whitefish could not be discounted.

In aggregate the available data indicate that Atlantic whitefish were extirpated from the Tusket-Annis rivers sometime after 1982. Atlantic whitefish now occur only within the Petite Rivière system, wherein life-cycle closure is now certain only for the freshwater resident members occurring in three semi-natural lakes which represent no more than 16km^2 of aquatic habitat. Atlantic whitefish occurrences within the Petite Rivière estuary are likely emigrants from the lakes, there is no evidence that anadromous members contribute to production. There are no records to suggest that Atlantic whitefish populations have occurred elsewhere in the province other than the Tusket-Annis and Petite river drainages.

Discussion

Species Trajectory

- A critical first step in the determination of the species trajectory is agreement on the indicator to be used to measure the species status. Rice (2004) provides a range of categories for the possible indicators. It was agreed to use spatial occupancy as the indicator of species status as information is generally limited to whitefish presence and absence by geographic area.

- There was discussion on the species' distribution over the long-term and the unlikelihood of the species having evolved separately in only two locations (Petite and Tusket) over 20,000 years. The species was likely more widespread at one time. Genetic data suggest that Atlantic whitefish are highly distinct from lake whitefish, however, there are no archived samples aquired from the Tusket-Annis Atlantic whitefish population suitable to assess their genetic relatedness to that of the Petite Rivière population.

- Since the first description of the species in 1922, Atlantic whitefish populations have only been documented in two areas: the Petite and Tusket watersheds. The last recorded occurrence in the Tusket was in 1982. Only the Petite (landlocked) component remains.

- The issue of anadromy was discussed. Anadromy is the ability to tolerate saltwater and a life-history strategy that has a genetic basis. Question was asked about historical evidence for anadromy in the Petite before the presence of dams. Some felt that anadromy no longer exists. Others considered that it does but that passage inhibits them. Land-locked fish are still salt tolerant (have the potential to successfully winter in sea-water). However, there are no data to confirm that a viable anadromous run ever existed on the Petite Rivière, largely due to a lack of monitoring during the appropriate season (i.e. fall migration to fresh water). Monitoring during the fall of 1999 failed to detect a single anadromous Atlantic whitefish.

- The conclusion reached about the species trajectory is one of decreasing anadromy (loss of 50% documented range in 3 generations) down to landlocked population in the Petite Rivière lakes with no evidence of recent expansion.

Present Species Status

- Present status: population estimate minimum 100-300 fish, maximum currently on the order of 1000.

- Endangered (Species listing: 1984 and 2000): Current species status from geographic range perspective is one half of known distribution as of 1982.

Target for Recovery

- It was pointed out that the target and timeframe for recovery is a consideration for an allowable harm assessment.

- With respect to recovery feasibility in the Petite (landlocked component) and target for recovery, the consensus was that there is not enough information to be definitive. However, range extension through repatriation of anadromy to the Petite Rivière, re-establishment in the Tusket and establishment of additional land-locked populations elsewhere were suggested as recovery options.

- With respect to threats by invasive species there was concern that smallmouth bass may influence the degree and timeframe for recovery. There was concern expressed about the stability of the Petite Rivière population in light of the unknown consequences of the presence of smallmouth bass.

- The expected order of magnitude / target for recovery is unknown. However, it was expressed that there is a need to increase the area of occupancy as a hedge against negative influences.

- In summation, the following recovery sequence was agreed to:
    1. Range expansion where possible (e.g. anadromy on the Petite Rivière);
    2. Hedge bets for the survival and recovery of the species (i.e. rescue populations established in secure lakes)
    3. Recolonization of Tusket with stocked fish;
    4. Introductions to other areas depending on evaluation (i.e. consider other options) .

Time Frame for Recovery

- Consensus was that the recovery timeframe is unknown.

Review of Scope for Human-Induced Harm

- The impact of scientific activity on Atlantic whitefish and the implications of allowing no additional mortality were discussed. The population seems to be maintaining itself under current threats, including scientific activities. Natural mortality is probably a larger source of mortality. It was felt that there is no choice but to continue research required to develop recovery actions.

- There is limited direct evidence for quantification of current human-induced mortality. To the degree that there is human-induced mortality, the rate is likely low. Consequently the current level of human-induced mortality does not likely jeopardize the survival or the potential for recovery.

- Given the uncertainty of population status and sources of mortality there is unlikely room for additional mortality, thus, additional sources of human-induced mortality or increases in current sources of human-induced mortality should not be permitted.

REVIEW OF SOURCES OF MORTALITY/HARM

Presentation Highlights

Bradford, R.G., H. Schaefer, and G. Stevens. Scope for Human-Induced Mortality in the Context of Atlantic Whitefish (*Coregonus huntsmani*) Survival and Recovery. 2004. DFO Can. Sci. Advis. Sec. Res. Doc. 2004/110.

Potential sources of human-induced harm, identified by an initial scoping exercise by Fisheries Management, Habitat Management and Science, were presented and discussed. In light of the collapse in distribution of Atlantic whitefish to the Petite Rivière drainage, those associated with future recovery activities that are intended to repatriate the species to the Tusket-Annis drainage are not subject to evaluation for

allowable harm permitting. These will be included in the Recovery Strategy. The following description of activities includes an indication of whether it has current relevance to species survival (and therefore a consideration for permitting) or recovery within the Petite Rivière drainage. Each was assigned a qualitative rank (e.g., high, moderate, low, not applicable) likelihood of imparting human induced mortality.

Threats Considered (Appendix V):

- Acidification (acid precipitation). Petite Rivière likely to maintain adequate buffering capacity, therefore low rank effect on survival. Portions of the Tusket are likely adequately buffered, therefore low rank effect on recovery.

- Land-use practices as they relate to forestry, agriculture, mining, and urbanization are issues relevant to both species survival and recovery. Rank effect likely low in the context of survival and likely low in the context of recovery except for urbanization which may have a moderate rank effect owing to greater population density within the Tusket-Annis riparian zones.

- Invasive species. Illegal introductions of non-native fish species is an issue for both survival and recovery. Smallmouth bass have a high rank effect on survival within the Petite Rivière whereas both chain pickerel and smallmouth bass may have a high rank effect on recovery within the Tusket-Annis drainage.

- Fish passage is likely to have a high rank effect on both survival and recovery. There is no access from the sea to lakes within the Petite Rivière that are known to support Atlantic whitefish. A hydroelectric dam is situated just above the head of tide on the Tusket River.

- Water extraction on the Petite Rivière for municipal use and agriculture is a consideration for survival. Rank effect is likely low-moderate.

- Water drawdown for the purposes of municipal use is an issue for survival on the Petite Rivière. Water draw down within hydroelectric reservoirs is a recovery issue on the Tusket River. Rank effects are low to moderate in both instances.

- Fishing (recreational angling, commercial). Atlantic whitefish are susceptible to capture by angling, commercial gillnets and traps. Recreational angling has a low rank effect on survival. Commercial fisheries may have a low rank effect on either survival or recovery owing to existing restrictions.

- Science/Recovery actions include removals of Atlantic whitefish from the wild to support captive breeding and incidental mortality during assessment and

research activities. Rank effect on survival is considered high. The rank effect on recovery is not known at present.

Discussion

Maximum Sustainable Mortality

- It was reiterated that given the uncertainly of impacts, additional sources of human-induced mortality and increases to current sources of human-induced mortality should not be permitted.

Potential Sources of Mortality and Aggregate Harm

- Comments on the survival table were:
  - Concerns around quarries, gold mining and decommissioning sites;
  - Need to describe impacts more specifically;
  - Need for categorizing direct and indirect impacts was questioned;
  - Need to break down the categories into existing regulations and who is responsible for administering them;
  - With respect to table column "Likely effect on survival of population", it was noted that this refers to the probability of decreasing the spatial distribution of the species;
  - Consensus was that table on survival needed to be modified. The suggestion was made to add a column on sector (e.g. forestry) and two additional columns for cause (e.g. damage to riparian zone) and effect (e.g. increased siltation).

- Comments on the recovery table were:
  - Question about recovery in terms of life history or geographic range;
  - Categories of threats (direct and indirect);
  - Need for qualifiers;
  - Additional considerations would be hydro-electric generation activities on the Tusket.

- Comparing the survival table to the activities listed in the framework document (Rice 2004) led to the following categorization by sector and relative rank effect on survival (HIGH, MEDIUM, LOW, NOT APPLICABLE (NA)) (Table 1).

  Domestic activities:
  - Directed fishing
    - NA; It is illegal to catch Atlantic whitefish
  - Bycatch
    - Recreational angling: LOW
    - Commercial fishing: LOW
  - Detrimental impacts on habitats by fishing activities
    - Substrate alteration, braiding, barrier to passage: LOW

- Direct mortality by permitted habitat alterations
  - Municipal water extraction: LOW
  - Hydroelectric generation: NA
  - Urbanization (docks, shoreline, alteration): HIGH
  - Presence of dams: HIGH
  - Irrigation: LOW
- Detrimental alteration of habitats by permitted activities
  - Hydroelectric generation: NA
  - Municipal water drawdown: LOW
  - Irrigation: LOW
  - Mining (acid mine drainage): MEDIUM?
  - Forestry (lack of riparian buffer): LOW
  - Agriculture (eutrophication, contouring, sedimentation): LOW
- Ecotourism and Recreation: NA
- Shipping & Transport and Noise: NA
- Fisheries on food supplies: NA
- Introductions and Transfers: NA; It was felt that although illegal introductions of smallmouth bass need to be dealt with in recovery strategy document, it should not appear in the table because it's not a permitted activity.
- Scientific research: Assessment & Research: HIGH
- Military activities: NA.

Non-Domestic Activities:

- Air Pollutants (Acidic precipitation): LOW

- Questions 6 (b), 7 and 8 from framework document were discussed.
  - Question 6 (b): Do Canadian activities alone impact the species? (e.g. international shipping, etc.). Don't know marine distribution and can't rule out acidification impacts.

  - Question 7: For those factors NOT dismissed, quantify to the extent possible the amount of mortality or harm caused by each activity. Not able to do due to information uncertainties.

  - Question 8: Aggregate total mortality/harm attributable to all human causes and contrast with that determined by questions #5. Not able to do due to information uncertainties.

<u>Alternatives to Activities and Feasible Mitigative Measures</u>

- The group discussed potential mitigation for those activities determined as having a high relative rank effect on survival (Table 1)

  - Fish passage: Alternatives - provide fish passage where it is currently blocked

- Research & Assessment: Alternatives – No; Mitigation - case by case consideration
- There was discussion about feasibility of collecting migrants (i.e. using natural mortality) as a broodstock alternative. It was pointed out that this may be contrary to the concept of expansion of the species range.
- Mining: Alternatives – None?; Mitigation - Best Management Practice (BMP). Discussion on regulations regarding existing abandoned mines (gold mines, shale pits and rock quarries). It was mentioned that capping exposed shale is used in the Town of Bridgewater.
- Urbanization: Alternatives – Watershed management Area; Mitigation – Best Management Practices equivalent

CONCLUDING REMARKS

The chair thanked the participants for their valuable participation and contribution. As stated at the start of the meeting, the main conclusions of the discussion are to be drafted as a CSAS Status Report. The discussion of the meeting will be drafted as a Proceedings document. Both documents will be circulated to the participants for their comment.

REFERENCES

Bradford, R.G., D. Longard, and P. Longue. 2004. Status, trend, and recovery considerations in support of an allowable harm assessment for Atlantic whitefish (*Coregonus huntsmani*). DFO Can. Sci. Advis. Sec. RAP Working Paper 2004/37.

Bradford, R.G., H. Schaefer, and G. Stevens. 2004. Scope for human-induced mortality in the context of Atlantic whitefish (Coregonus huntsmani) survival and recovery. DFO Can. Sci. Advis. Sec.RAP Working Paper 2004/38.

Edge, T.A., and J. Gilhen. 2001. Updated status report on the endangered Atlantic Whitefish, Coregonus huntsmani. Canadian Field-Naturalist 1115(4): 635-651.

Rice, J. 2004. Proceedings of the National Science Advisory Meeting on Section 73 Permits under the Species at Risk Act March 8-10, 2004. DFO Can. Advis. Sec. Proceed. Ser. 2004/005.

Table 1. Summary of human activities permitted by DFO or permitted by another agency which may contribute to total mortality or harm to the species. Activities are categorized by sector and have been assigned a relative rank effect (1 =highest, 2 =moderate, 3 =lowest). The cause and effect on survival of each is indicated. Alternatives to the acitivity and possible mitigative measures are indicated.

Activity	Sector	Rank Effect On Survival	Cause	Effect	Alternatives	Mitigation
Domestic						
Directed Fishing	NA; illegal	NA				
Bycatch	Recreational angling	3	Capture on hook and line	Handling mortality	Varied season closures	In Effect
	Commercial fishing	3	Capture in traps/nets	Entanglement, entrapment, handling mortality	Relocate fishery	Varied closures, relocations Partial application currently
Detrimental Fishing Effects on Habitat	Commercial fishing	3	Substrate alteration	Alteration of supporting habitat	Regulate change to fishing practices, relocation of fishery	Possible
		3	installation of gear	Barrier to passage	Regulate change to fishing practices	Possible
Direct Mortality Under Permit	Hydroelectric generation	NA	Passage through turbines, ineffective fish passage facilities	Mortality, Injury, Delayed or unsuccessful migration	Regulate improvements	Possible
	Municipal water extraction	3	Intrusion of fish into water intakes	Mortality, injury	None	Improve screening if necessary
	Presence of Dams	1	Barrier to Fish Passage	Prohibits life-cycle closure	Provide adequate upstream and downstream passage	
	Urbanization	1	Shore line alteration, domestic waste leachate	Habitat alterations, reduced water quality	Watershed management	Best management practices
	Irrigation	3	Entrainment of fish	Mortality, loss from spawning population	none	Improve screening, best management practices
Detrimental Habitat Alterations	Hydroelectric generation	NA	Dewatering of habitat , reduced forage base	Mortality, reduced production	none	Regulate reservoir operations, best management practices
	Municipal water drawdown	3	Dewatering of habitat , reduced forage base	Mortality, reduced production	none	Regulate reservoir operations, best management practices

Activity	Sector	Rank Effect On Survival	Cause	Effect	Alternatives	Mitigation
Detrimental Habitat Alterations (cont.)	Irrigation	3	Reduced river discharge	Possible loss of habitat	none	Monitor rate/quantity of water extract; Best management practices
	Mines/Quarries	2?	Unmitigated acid run-off	Acid toxicity	None	Best management practices
	Forestry	3	Damage to riparian zone	Increased siltation	None	Best management practices
	Agriculture	3	Land wash	Eutrophication, siltation	none	Best management practices
Ecotourism and Recreation	NA					
Shipping&Transport and Noise	NA					
Fisheries on Food Supplies	NA					
Introductions and Transfers	NA					
Scientific Research	Assessment and Research	1	Removals to support captive rearing	Reduced production	None	Allowable on condition of demonstrable surplus to survival requirements
		1	Handling mortality during sampling	Reduced production	None	Case by case consideration
Military Activities	NA					
Non-Domestic Air Pollutants	Acidic precipitation	3	River acidification	Acid toxicity	None	Not required provided natural bufferig capacity remains adequate

Appendix I: List of Participants

Participant	Affiliation/Address	Telephone	E-mail
Amiro, Peter	DFO, Science, Maritimes	902-426-8104	AmiroP@mar.dfo-mpo.gc.ca
Bentzen, Paul	Dalhousie University	902-494-1105	paul.bentzen@dal.ca
Bradford, Rod	DFO, Science, Maritimes	902-426-4555	BradfordR@mar.dfo-mpo.gc.ca
Burgess, Carys	Nova Scotia Power Inc.	902-428-7590	carys.burgess@nspower.ca
Cook, Adam	Dalhousie University	902-896-0311	amcook@dal.ca
Daborn, Graham	Acadia University	902-585-1118	graham.daborn@acadiau.ca
Davison, Bev	DFO, Science, Maritimes	902-354-5443	DavisonBS@mar.dfo-mpo.gc.ca
Elderkin, Mark	Nova Scotia Dept. Natural Resources	902-679-6091	elderkmf@gov.ns.ca
Fox, Mike	Bridgewater Public Service Commission	902-521-4935	mfox@town.bridgewater.ns.ca
Gilhen, John	Nova Scotia Museum of Natural History	902-424-7370	gilhenja@gov.ns.ca
Hebda, Andrew	Nova Scotia Museum of Natural History	902-424-6455	hebdaaj@gov.ns.ca
Hiltz, Tim	Bridgewater Public Service Commission	902-543-4254	thiltz@town.bridgewater.ns.ca
Longard, David	DFO, Science, Maritimes	902-426-9373	LongardD@mar.dfo-mpo.gc.ca
MacLean, Don	Nova Scotia Dept. Agriculture and Fisheries	902-485-7022	MacleanD@gov.ns.ca
Marshall, Larry	DFO, Science, Maritimes	902-426-3606	MarshallL@dfo-mpo.gc.ca
McPherson, Arran	DFO, Species at Risk Coordination, Maritimes	902-426-8503	McPhersonA@dfo-mpo.gc.ca
Meade, Ken	Nova Scotia Power Inc.	902-428-7599	Ken.meade@nspower.ca
Mossman, Scott	DFO, Conservation and Protection, Maritimes	902-354-6030	MossmanS@mar.dfo-mpo.gc.ca
O'Boyle, Robert	DFO, Science, Maritimes	902-426-3526	OboyleR@dfo-mpo.gc.ca
O'Neil, Shane	DFO, Science, Maritimes	902-426-1579	OneilS@mar.dfo-mpo.gc.ca
Robichaud-Leblanc, Kimberly	DFO, Species at Risk Coordination, Maritimes	902-426-7958	RobichaudK@mar.dfo-mpo.gc.ca
Schaefer, Heidi	DFO, Habitat Mgmt., Maritimes	902-426-4320	SchaeferH@dfo-mpo.gc.ca
Smedbol, Kent	DFO, Science, Maritimes	506-529-5976	SmedbolK@dfo-mpo.gc.ca
Stevens, Greg	DFO, Resource Mgmt., Maritimes	902-426-5433	StevensG@dfo-mpo.gc.ca
Weber, Gary	DFO, Resource Mgmt., Maritimes	902-426-1488	WeberG@dfo-mpo.gc.ca
Wheaton, Thomas	DFO, Habitat Mgmt., Maritimes	902-527-5596	wheatonT@mar.dfo-mpo.gc.ca
Whitelaw, John	DFO, Science, Maritimes	902-354-5443	WhitelawJ@mar.dfo-mpo.gc.ca

Appendix II: Letter of Invitation

Fisheries and Oceans Pêches et Océans

19 October 2004

Dear Participant:

Re: Regional Advisory Process Review on Level of Allowable Mortality Associated with Atlantic Whitefish.

The prohibitions associated with the Species at Risk Act (SARA) came into force on June 1, 2004; subsequently, Atlantic whitefish are legally protected from activities that contravene these prohibitions. SARA provides that the Minister of Fisheries and Oceans may issue a permit to allow for incidental harm to a listed species if a number of conditions are met (SARA Section 73 (2, 3)).

A Regional Advisory Process (RAP) meeting is scheduled for 23 November 2004 (Tuesday) to review the level of allowable mortality on Atlantic whitefish. Therefore, we invite your participation in this review which is scheduled to **begin at 9:00AM and conclude at 4:00PM** in the Harbour Front Meeting Room at the Coastal Inn, Windmill Rd., Dartmouth.

An evaluation framework, consisting of three phases, has been established by DFO to allow determination of whether or not SARA permits can be issued. All three phases of this framework will be applied at this meeting.

Thank you for your consideration of this request. I would appreciate confirmation of your participation (either in person or via telephone) in this process to Lynn Cullen @ 902-426-4164.

Yours sincerely,

Robert O'Boyle
Associate Director of Science; RAP Co-ordinator

Appendix III: Terms of Reference

Background

Atlantic Whitefish has been designated as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and listed in Schedule 1 of the Canada's Species at Risk Act (SARA). The recovery team for the Atlantic whitefish developed a species specific recovery plan in 2001. However, the team is now updating this document by creating a Species at Risk Recovery Strategy that will identify obstacles to the survival of this species and broad measures that could be taken to overcome these obstacles. However, there may be activities impacted by these measures. SARA authorizes competent Ministers to permit otherwise prohibited activities affecting a listed wildlife species, any part of its critical habitat, or the residences of its individuals. Section 73(3) of SARA establishes that the permit can only be issued if the following conditions are met:

1. all reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted
2. all feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals, and
3. the activity will not jeopardize the survival or recovery of the species

An evaluation framework, consisting of three phases (species status, scope for human – induced harm and mitigation) has been established by DFO to allow determination of whether or not SARA permits can be issued. All three phases of this framework will be applied to Atlantic Whitefish at this meeting.

Objectives

Phase I: Species Status

1. Evaluate present species trajectory
2. Evaluate present species status
3. Evaluate expected order of magnitude / target for recovery
4. Evaluate expected general time frame for recovery to the target

Phase II: Scope for Human – Induced Mortality

5. Evaluate maximum human-induced mortality which the species can sustain and not jeopardize survival or recovery of the species
6. Document major potential sources of mortality/harm

7. For those factors NOT dismissed, quantify to the extent possible the amount of mortality or harm caused by each activity.

8. Aggregate total mortality / harm attributable to all human causes and contrast with that determined in task 5

Phase III: Mitigation and Alternatives

8. Develop an inventory of all reasonable alternatives to the activities in task 7, but with potential for less impact. (e.g. different gear, different mode of shipping)

9. Develop an inventory of all feasible measures to minimize the impacts of activities in task 7

10. Document the expected harm after implementing mitigation measures as described and determine whether survival or recovery is in jeopardy after considering cumulative sources of impacts

Products

Status Report on all tasks

Proceedings of meeting

Research Document

Participation

DFO Science
DFO Fisheries Management
DFO Habitat Management
NS Department of Agriculture and Fisheries
Atlantic Whitefish Recovery Team
External Reviewers

Appendix IV: Agenda

Level of Allowable Mortality of Atlantic whitefish
Meeting of the Maritimes Regional Advisory Process
Harbour Room, Coastal Inn
Dartmouth, N.S.
23 November 2004

9:00	Welcome and introductions (Chair B. O'Boyle)
9:15	Working paper on Phase I (R. Bradford)
10:00	Break
10:15	Working paper on Phase II (R. Bradford)
11:00	Discussion
12:00	Lunch
13:00	Phase III / Plenary
15:00	Break
15:15	Discussion and Finalization of Status Report
17:00	Adjournment

Appendix V: Tables 2 and 3.

Table 2. Likelihood that activity will result in human-induced mortality greater than zero, and therefore requires consideration for allowable harm in the context of survival in the Petite Rivière drainage (NA = not applicable).

		Likely Effect	Confidence	
Threat	**Activity**	**On Survival**	**Score**	**Basis for Score**
Acidification	Acid precipitation	Low	High	Supporting science
Land-use	Forestry	Low	Moderate	Existing regulations; enforcement required
	Agriculture	Low	Moderate	Existing regulations; enforcement required
	Mining	Low	Moderate	Existing regulations; enforcement required
	Urbanization	Low	High	Municipal water supply restrictions
Invasive species	Chain pickerel	NA	High	Not present
	Smallmouth bass	Moderate-High	High	Supporting equivalent research
Fish passage		Low	Moderate	Lack of data
Water extraction	Municipal	Low-Moderate	Moderate	Lack of data re: entrainment
	Agriculture	Not Known	Moderate	Scope of irrigation with river water not known
Water drawdown	Hydroelectric	NA	High	Not present
	Municipal	Moderate-High	High	Supporting equivalent research
Fishing	Recreational	Low	High	Varied closures, gear restrictions
	Commercial	NA?	???	Do we allow harm to 'strays"?
Science\Recovery	Broodstock	Low	Moderate	Removals low relative to assumed abundance
	Assessment	Low	Moderate	Low mortality, policy of minimizing stress
	Research	Low	High	Actions contingent of reliable abundance data

Table 3. Likelihood that activity will result in human-induced mortality greater than zero, and therefore requires consideration for allowable harm in the context of recovery in the Tusket-Annis system (NA = not applicable).

		Likely Effect	Confidence	
Threat	**Activity**	**On Recovery**	**Score**	**Basis for Score**
Acidification	Acid precipitation	Low	High	Supporting science
Land-use	Forestry	Low	Moderate	Existing regulations; enforcement required
	Agriculture	Low	Moderate	Existing regulations; enforcement required
	Mining	Low	Moderate	Existing regulations; enforcement required
	Urbanization	Moderate	High	Portions of Tusket-Annis and lower Petite Rivière urbanized
Invasive species	Chain pickerel	Not Known	High	No information on freshwater residency time of anadromous Atlantic whitefish
	Smallmouth bass	Not Known	High	No information on freshwater residency time of anadromous Atlantic whitefish; Recovery not dependent on land-locked variant in Tusket or elsewhere in Petite
Fish passage		Moderate-High	Moderate	Historical indication of problems, however mitigation feasible
Water extraction	Municipal	Not Known	Moderate	NA on Tusket; increased extraction from Petite requires assessment
	Agriculture	Not Known	High	Data deficient
Water drawdown	Hydroelectric	High	High	Historical indication of problems, however mitigation feasible
	Municipal	NA?	Low	Access to Petite lakes required?
Fishing	Recreational	Low	High	Varied closures, gear restrictions
	Commercial	High	High	Bycatch known historically, mitigable?
Science\Recovery	Broodstock	NA	High	Largely pertains to land-locked population
	Assessment	NA	High	Largely pertains to land-locked population
	Research	NA	High	Largely pertains to land-locked population